Second Harmonic Generation in Highly Nonlinear $LiNbO_3$ Photonic Crystals

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Fabrication and second harmonic generation (SHG) characteristics of two-dimensional (2D) photonic crystal (PhC) waveguides using highly nonlinear $LiNbO_3$ have been demonstrated and studied. Large enhancement of the SHG in ultraviolet (UV) and deep-UV (DUV) regions has been observed in the $LiNbO_3$ PhC waveguide.

We have revealed the physical mechanism of the enhancements of SHG originating from band dispersion nature by comparing the observed nonlinear optical responses with the photonic band structure features examined by 3D finite-difference time-domain calculations and polarized-angular-dependent reflectivity measurements[1-3].

[1] S. Inoue, et al., *Physical Review Letters*, (2005) in press.
[2] S. Inoue, et al., *Physical Review B*, **69**, 205109 (2004).
[3] S. Inoue, et al., *Applied Physics Lett*ers **82**, 2966 (2003).